

ABSTRAK

PEMBUATAN ADSORBEN DARI CANGKANG BUAH KARET (*Hevea brasiliensis*) UNTUK MENURUNKAN KADAR LOGAM Zn PADA LIMBAH TEKSTIL

Leni Maharani Arroyan, 2025, 67 Halaman, 21 tabel, 37 Gambar, 4 lampiran

Pencemaran logam berat seperti Zn (seng) pada air limbah industri menjadi isu lingkungan yang serius karena dampaknya terhadap kesehatan dan ekosistem. Penelitian ini bertujuan untuk memanfaatkan limbah cangkang buah karet sebagai bahan dasar pembuatan adsorben karbon aktif guna menurunkan kadar logam Zn dalam air. Adsorben dibuat melalui metode aktivasi fisika dan kimia, serta diuji efektivitasnya berdasarkan variasi waktu kontak. Aktivasi fisika dilakukan pada suhu 750°C, sementara aktivasi kimia menggunakan H₃PO₄ 1N. Pengujian meliputi kadar air, kadar abu, kemampuan adsorpsi, serta analisis isoterm adsorpsi. Hasil menunjukkan bahwa aktivasi kimia menghasilkan adsorben dengan kadar air 6% dan kadar abu 4%, lebih rendah dibanding aktivasi fisika. Adsorben menunjukkan efektivitas maksimum pada waktu kontak 180 menit dengan efisiensi penurunan Zn mencapai 99,39% (kimia) dan 99,27% (fisika). Model isoterm Freundlich lebih sesuai menggambarkan proses adsorpsi berdasarkan nilai koefisien korelasi R² sebesar 0,9659 (fisika) dan 0,9675 (kimia). Dengan demikian, cangkang buah karet berpotensi sebagai adsorben ramah lingkungan untuk pengolahan limbah logam berat.

Kata kunci: Adsorpsi, Zn, Cangkang Buah Karet, Karbon Aktif, Isoterm Freundlich, Aktivasi Kimia dan Fisika.

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ABSTRACT

PREPARATION OF ADSORBENT FROM RUBBER FRUIT SHELL (*Hevea brasiliensis*) TO REDUCE Zn METAL CONTENT IN TEXTILE WASTEWATER

Leni Maharani Arroyan, 2025, 67 pages, 21 tables, 37 figures, 4 appendicies

Heavy metal pollution such as Zn (zinc) in industrial wastewater has become a serious environmental issue due to its impacts on health and ecosystems. This study aims to utilize rubber fruit shell waste as a raw material for producing activated carbon adsorbents to reduce Zn levels in water. The adsorbents were prepared using physical and chemical activation methods and tested for their effectiveness based on variations in contact time. Physical activation was conducted at a temperature of 750°C, while chemical activation used 1N H₃PO₄. The evaluations included moisture content, ash content, adsorption capacity, and adsorption isotherm analysis. The results showed that chemical activation produced adsorbents with 6% moisture content and 4% ash content, which were lower than those from physical activation. The adsorbents demonstrated maximum effectiveness at a contact time of 180 minutes, with Zn removal efficiencies reaching 99.39% (chemical) and 99.27% (physical). The Freundlich isotherm model was more appropriate for describing the adsorption process based on correlation coefficient (R^2) values of 0.9659 (physical) and 0.9675 (chemical). Therefore, rubber fruit shells have potential as environmentally friendly adsorbents for treating heavy metal wastewater.

Keywords: Adsorption, Zn, Rubber Fruit Shell, Activated Carbon, Freundlich Isotherm, Chemical and Physical Activation.